Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 110 (2014) 320 – 329

Procedia
Social and Behavioral Sciences

Contemporary Issues in Business, Management and Education 2013

Methodics of identification level of service quality in railway transport

Eva Nedeliaková[a]*, Jana Sekulová[a], Ivan Nedeliak[b], Martin Ľoch[a]

[a]*University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Railway Transport, Univerzitná 8215/1, Žilina 010 26, Slovak Republic*
[b]*Railway company Cargo Slovakia, a.s., Department of Strategy and Development, Hviezdoslavova 31, Žilina 010 02, Slovak Republic*

Abstract

The goal of contribution is characterize methodics of identification level of services quality, which is a result from extensive researches being solved at Department of Railway transport, University of Žilina. The first part of the methodics is characterised by calculating the complex indicator of quality for the corresponding process of the provision of service, second part is focused on customer, employee and supplier oriented approach in terms of compliance with principles applicable to railway transport. Unique and universal character predetermines methodics for use in all technological processes of transport chain in railway transport.

Keywords: quality; railway transport; customer; service.

1. Introduction

The service quality rating must respect its specific properties which are unrepeatability, impalpability, their use right at the time they are provided and particularly changeability, which is significant factor in the conditions of rail transport as well. These peculiarities influence the quality of service regarding the constantly increasing requirements. In the contemporary literature in Slovak republic the quality of service problem is discussed mostly theoretically, often only in general which absents the usage of approaches particularly in the conditions of railway transport. There exist several models of service quality abroad which are often concerned about this problem in

* Corresponding author. Tel.: +421-41-513-3409.
E-mail address: eva.nedeliakova@fpedas.uniza.sk

doi:10.1016/j.sbspro.2013.12.876

different aspects, different from conditions of railway transport which for railway transport implies that it is a necessity to look for more suitable approaches. In service quality rating in a company it is important to take in mind approaches of those methods, techniques and models of quality which connect objective and subjective aspects of rating. That was the impulse for creating a scientific research which one of the outputs is this article.

The goal of the research was solving the current issue necessary to keep railway transport on track of the transport market concerning the search for innovative options of service quality identification.

The goal of this article is the characteristics of author created methodics as a progressive approach towards service quality rating which allows identifying the current service quality level, to find the cause of dissatisfaction of customers and company employees. This approach also not only finds the pros and cons of the company, but also its suppliers and competition. It offers relevant data for the process of constant service quality improvement and brings qualified, measurable outputs with the option of evaluating trends in service quality.

Within the mentioned properties it concerns an important role of created methodics which is unique, subsequent to research works carried by the railway company in Slovak republic which are stated in the list of used literature. One of the most important, extensive research tasks on which this research is followed up, was task solved in 2004–2006 called Methodics of identification and analysis of elements of quality in transport processes and services. It has become the early set of thoughts towards the service quality issue in railway transport while it was realised with the cooperation of the University of Žilina, railway transport institute, railway research and innovation department of Slovak republic, transport research department supported by ministry of transport, posts and telecommunication of Slovak republic, University of Pardubice in Czech republic, railway company Cargo Slovakia, a.s. as well as foreign railway carriers operating in Europe. The newest methodics specified in this article continues with the ideas of the original research and brings a more modern view of the service quality in railway transport which wasn't implemented in this state until its suggestion and application.

Contribution is processed in terms of solving grant problem VEGA 1/0188/13 "Elements of quality of integrated transport system with effective public service offer in transport in context of globalisation" which is being solved at Department of Railway transport, Faculty of operation and economics of transport and communications, University of Žilina.

2. Methodology for identifying levels of quality of service

New methodics of identification level of quality services was successfully applied in the conditions of transport enterprise, carrier offering services of rail freight transport, specifically in the application on conditions of wagon load transport. This methodology, verified in practice, can be used in a uniform manner. It is unified and thus applicable in different branches and types of business.

Methodics of identification of the level of quality of service is divided into two parts. The first part of the methodics is characterised by calculating the complex indicator of quality for the corresponding process of the provision of service. It is based on two basic sources:

- Questionnaires for customers, which serve to detect the weight of the process (this part of research was supported by software solution)
- Process cards for the auditor of company, developed for individual phases of provision of service, which are detailed in the research

Second part of the level of quality identification methodics is focused on three approaches: customer, employee and supplier oriented approach. Methodics of the calculation of complex quality marker is intended for executing intern audit for the needs of the company management. The very methodics procedure is following:

- designed different questionnaires for customers, particularly for the pre-transport, during transport and post-transport phases
- questionnaire is published on the internet portal
- intern audit is held twice a year, in June and December
- customers in questionnaires will fill in the weight, which they ascribe to a process in individual transport chain phases with three options: high, medium and low weight

- auditor will process for individual train stations and transport chain phases questionnaires and calculate the weight coefficient (Nedeliaková, 2010).

The weight coefficient is designed in the following way:

$$kv_j = \sum_{i=1}^{n} v_j / nkv \tag{1}$$

In which: kv_j – weight coefficient of respective process
v_i – weight value for corresponding answer in questionnaire (i-here answer from the questionnaire, the domain of definition is an open interval 0-2 i.e. (0.2), while the questionnaires can be selected for one answer only one level weights as low weight of 0.5; the middle weight with value of 1 or high weight with value 1.5)
n – number of answers in questionnaires.

- After calculating the weight coefficient auditor monitors and identifies the quality level of processes right in the process card, assign points based on the score from the process card for corresponding stations and segments, fill in process card, process results from the process card and evaluate them
- Calculate complex quality marker for corresponding process based on the designed formula:

$$KU_j = Q_j x kv_j \quad \text{[number of points]} \tag{2}$$

In which: KU_j – complex quality marker for respective process,
Q_j – level of fulfilment, real number of points of respective process in stations or segments from the intern audit, in which complex quality marker for respective process can achieve a maximum of 10 points.

Limit of acceptability within the model is set to 5 points (Figure 1).

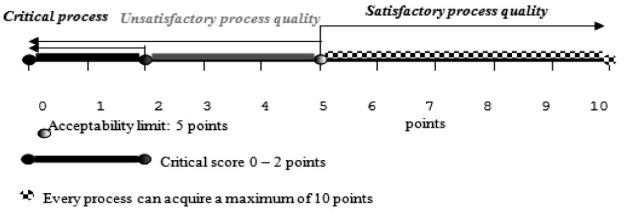

Fig. 1. Acceptability limit of quality service within the model

Auditor calculates the total complex quality marker based on the designed formula for respective station respectively segment:

$$CKU = \sum_{j=1}^{m} Q_j x kv_j \quad \text{[number of points]} \tag{3}$$

- auditor compares the value of total complex CKU marker with the scoreboard listed in the process card, particularly for each station respectively segment. The final solution must be noted in the "Intern audit registry"
- time set for the intern audit for 1 railway station is 2 weeks
- auditor decides about the quality of individual processes, forms a document named "Intern audit registry", separately for satisfactory rated processes, which passed the acceptability limit of 5 points (from the process card), separately for unsatisfactory processes, which have not passed the acceptability limit of 5 points (from the

process card) and separately for critical processes, which acquired critical score of 0-2 points (from the process card). (Nedeliaková, 2012)

In the following tables 1 to 4 there is listed a fragment of specific model quality rating developed by the authors, which serves as a service quality identification support in the application on the rail freight transport in individual transport phases: pre-transport, during transport and post-transport. We feature examples only for the pre-transport phase.

Table 1. Examples of rating criteria via the process card

Pre-transport		
	Process	Criterion
1.	Direct customer contact	Understanding and knowledge of customers
2.	Employee codex	Customer care
3.	Knowledge level	Understanding and knowledge of customers
4.	Information through the internet	Information, Accessibility
5.	Advertisement	Communication
6.	Place equipment	Trustworthiness
7.	Wagon stock	Accessibility
8.	railway operation techniques	Accessibility
9.	On time information	Time
10.	Transport order	Customer care
11.	Placing of wagons at Loading	Understanding and knowledge of customers
12.	Loading	Customer care
13.	Consignment soundness	Reality

Table 2. Point rating fragment via the process card

Pre-transport process quality score for 7th, 8th and 9th process					
Num.	0 points = Unsatisfactory quality	2 points = partial satisfactory	5 points = standard	8 points = Over standard	10 point = Fully satisfactory
7.	outdated; unsatisfactory wagon stock	outdated wagon stock but satisfactory	satisfactory	modern; satisfactory; needed accessories	modern; satisfactory; evolving due to the client's requirements; accessories
8.	Without equipment; unable to load	outdated base	satisfactory	modern and satisfactory	modern and satisfactory, evolving due to the client's requirements
9.	Without information about the price and time of the transport, without response to client's questions	Response to client's questions	timely information about the price and time of the transport	timely information about the price and time of the transport, response to client's questions	timely information about the price and time of the transport, quick response to client's questions, promptness

Station score through process card continues by forming rating tables with given date, process card number and making a registry of the score. Auditor calculates the process weight coefficient and sets the number of points modified by the process weight. Every station can acquire a maximum of 130 points and each process 10 points.

Table 3. Example of total quality rating level of station in process card.

N.	Station	Total score	Percentage evaluation of process quality	Total score modified by the process weight CKU	Percentage evaluation of process quality modified by the process weight
1.	Bratislava východ	61	46.92%	45.47	34.98%
2.	Čierna nad Tisou	49	37.69%	38.00	29.23%
3.	Košice	66	50.77%	51.30	39.46%
4.	Zvolen freight station	65	50.00%	55.00	42.31%
5.	Žilina	67	51.54%	53.50	41.15%

Table 4. Pre-transport rating scale.

Number of points	Quality level	Number of points	Quality level
0–25	Unsatisfactory quality	76–100	Over standard
26–50	Partially satisfactory quality	101–130	Fully satisfactory target quality
51–75	Standard		

In Figure 2 is shown procedure of quality level identification

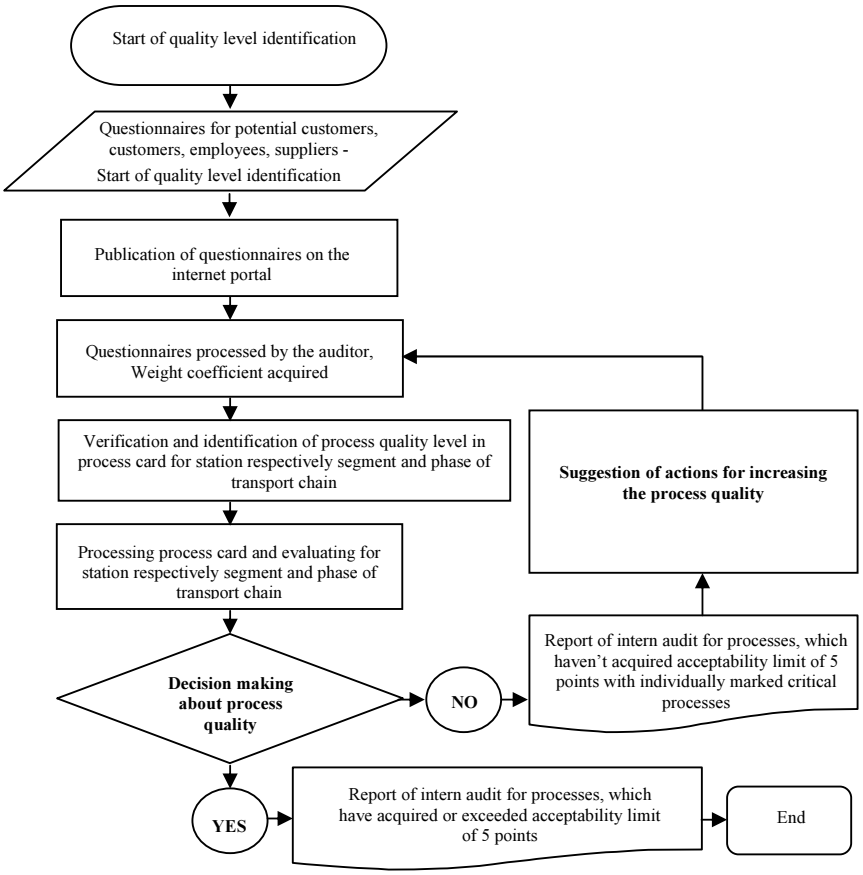

Fig. 2. Flow chart of quality level identification methodics

For processes, which have not acquired acceptability limit of 5 points (critical process included) auditor suggests corrective actions with the cooperation with a liable employee (competent process owner), when they don't agree on corrective actions, auditor states this fact in the"Intern audit registry". This fact needs to be retired to the company management and it solves the case without the cooperation with the owner and immediately states corrective actions for increasing the quality of competent process i. e. introduction of activities necessary for achieving the wanted quality level and constant improvement of this process, respectively introducing methods necessary for securing an effective operator and management of this process (graphical illustration in Figure 3).

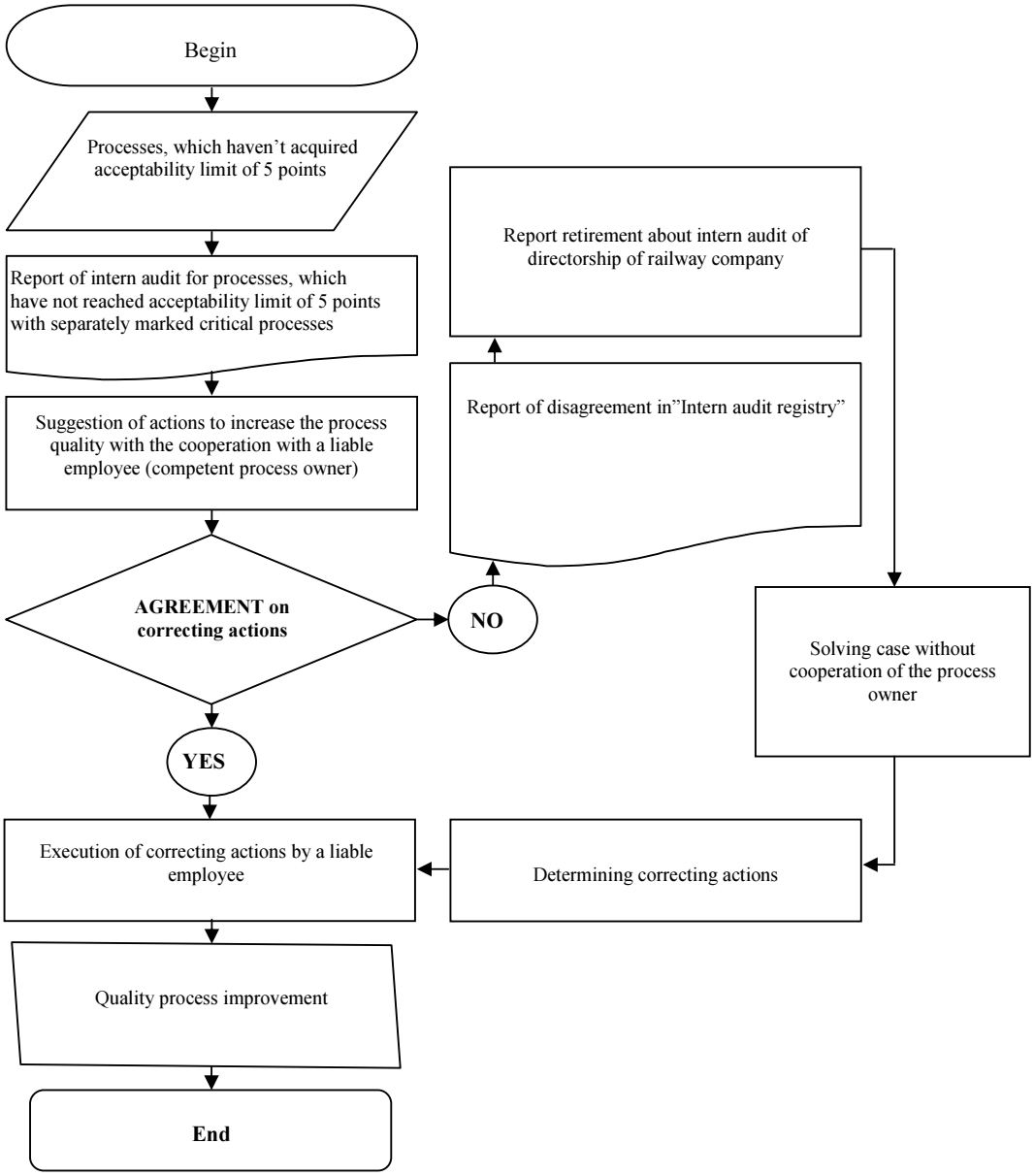

Fig. 3. Increase of quality processes, which haven't reached the acceptability limit of 5 points during audit execution.

During decision about the critical processes, the intern audit will again evaluate processes suggested by the methodics and if the processes again acquire critical score (0-2 points) and will write a report about unacceptable state, who resigns immediate supervisor responsible employee, which will again initiate correcting actions (shown in Figure 4).

There can occur only two cases in deciding about process quality – satisfactory or unsatisfactory process quality (based on model score rating in given process card).

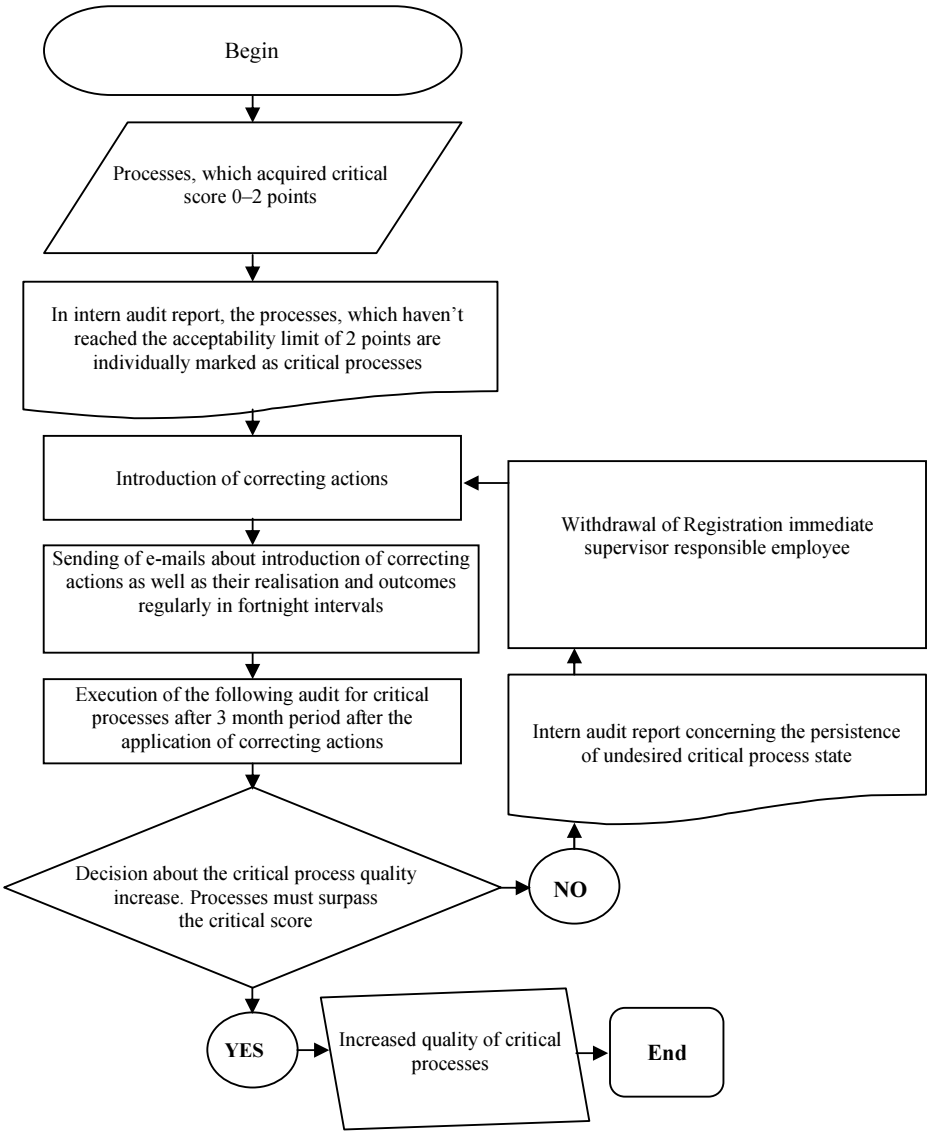

Fig. 4. Procedure concerning the critical process quality increase.

Measures for the increase of process quality should be derived from so called continual improvement principle which is derived from KAIZEN philosophy (Mateides, 2006). In terms of quality monitoring it is important that following approaches are used:

- Customer oriented approach:
  - Railway company must create a mechanism, which will ensure the update and satisfaction of customer's needs
  - Plans, vision, strategy and targets must be up to date if the customer modification occurs

- Potential customer oriented approach:
  - Railway company must create its own intern system which can look through a customer and his intentions
  - Railway company must establish a communication system which will repeatedly look for new ways of gaining potential customers and simultaneously offers products of railway company to the widest potential market
  - Modern plans for obtaining potential customers must be kept as project plans where appropriate methods of modern planning with typical software support can be appointed

- Employee oriented approach:
  - Railway company management must enforce employee courage participate in improvement.
  - Railway company employees must attend and ask which activities are needed for the quality process increase and what benefits it will bring
  - Railway company must create employee rating, employee education and employee needs identification systems
  - Potential barriers inside Railway company must be identified and eliminated

- Process oriented approach:
  - Railway company must identify all its processes and list them in a appropriate manner (process card)
  - For every process must be identified owner of the process, process customer or process supplier (identification ensures intern audit)
  - Processes must be rated in regular intervals (i.e. intern audit will be held twice a year, in June and December)
  - All processes and activities, which railway company performs and don't give any value to the final product must be eliminated

- Supplier oriented approach:
  - Railway company must use only those, which will ensure the accomplishment of desired parameters based on customer needs
  - Railway company prefers only principle of reliable, on time and high-quality delivery

- Third party oriented approach:
  - A mechanism must be set in railway company, which will ensure the update of needs of all stakeholders
  - A mechanism must be set in railway company, which will ensure the satisfaction of needs of all stakeholders
  - Railway company must appoint a modern suitable system for increasing the communication speed between the company and stakeholders

Railway company approaches for increasing the process quality bring results shown in Figure 5.

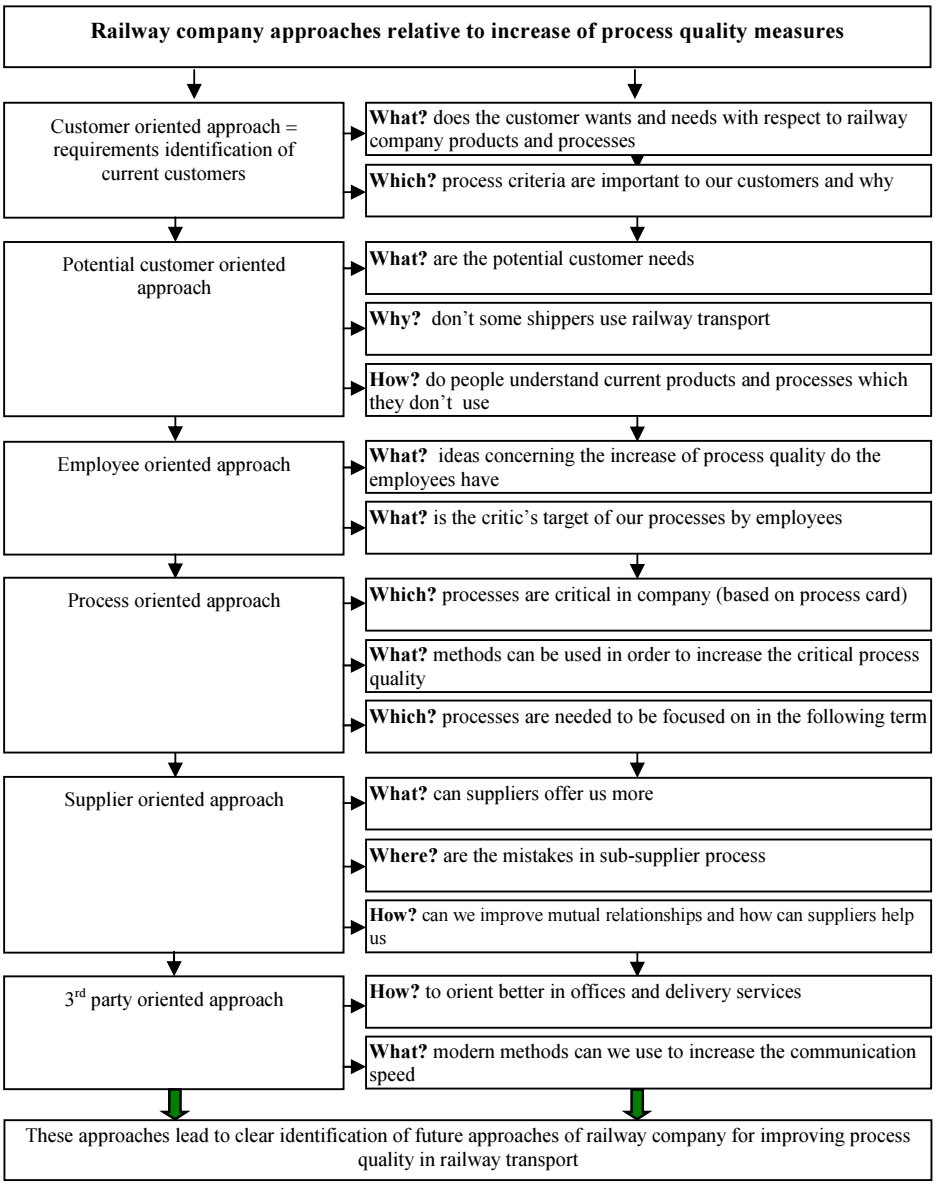

Fig. 5. Constant process improvement approaches.

By correct selection of service quality criteria we can observe and evaluate quality and on this basis we can realise intern audit. This unified quality rating system can be applied for all kinds of service, departments and companies. It is inevitable in terms of strategic decisions in practical company operations. It can become a way out for regulation of service, which increase in quality is urgent condition for keeping companies in competitive business environment.

Service quality improvement is difficult in terms of their necessary interconnection so that the customer gains the most benefit. It is long term and never ending process. Customer requirements are diverse and persistently changing.

It is only a matter of time when will every organisation, if they want to succeed on market, is forced to invest all their effort to quality and trying to constantly satisfy the needs for their customers which can be done only by perfect knowledge.

3. Conclusion

In terms of theories which deal with mentioned issue, the gain of created methodics lies in stating new progressive approach towards service quality in railway transport. Railway companies in Slovak republic in June this year started using this methodics and they realised an audit whose results are more comprehensible and clearer thanks to the new procedure. Significant asset is revelation of substantial tight spots in all phases of transport chain, which were hidden until now. Thanks to chronological procedure, defined in methodics are caught all elements of transport chain which affect transport technology both positively and negatively. From the side of the railway transport management there exist positive feedback on this, scientifically approved, fluent process of monitoring service quality whose level is often changed by the influence of stochastic factors. These factors, thanks to the unique, suggested methodics, can be perceived more flexible and operatively interfere within the work of whole dispatching apparatus participating in the control of railway traffic.

References

Čamaj, J., Mašek, J., & Kendra, M. (2010). Transfer innovative knowledge to transport technologies and logistic processes, LOGI 11: 11th international scientific conference. Pardubice, Czech Republic, paper 34–38.

Dolinayová, A., & Čamaj, J. (2011). The orzanization of the wagon flows with respect to the economic criteria of railways companies, LOGI 2011: 12th international scientific conference. Pardubice, Czech Republic, paper 140–148.

EN 13816: Transportation – Logistics and services – Public passenger transport; Definitions, Determination of the performance goals and measuring of the quality on the service.

Klementová, J., & Šatanová, A. (2013). Human resources as a significant factor quality services, Development of human potentional: 10th international scientific conference. Žilina, Slovak Republic, paper 154–162.

Majerčák, J., Nedeliaková, E., Nedeliak, I., Gašparík, J., Harmanová, D., Kováč, M., Buček, O., Dolinayová, A., Buková, B., & Knižka, J. (2006). Methodology for identifying and analyzing elements of quality traffic and transport processes and services, project no. 1/1236/2004.

Majerčáková, E., & Majerčák, P. (2012). Railway transport market and factors of its development. *Enterprise economy and management, Electronic scientific magazine about enterprise economy, management, marketing and logistics*, *2*, 23–27.

Mateides, A. (2006). *Quality management – history, concepts, methods*. Banská Bystrica: University of Matej Bel.

Nedeliaková, E. (2010). Complex analysis and classification of tools for transport regulation in context with perspectives and chalanges of liberalised trannsport market, VEGA 1/0411/08.

Nedeliaková, E., & Nedeliak, I. (2007). Railway freight transport quality – key to sustainable development, Railway transport and logistics. *Electronic professional journal about railway transport and traffic, logistics and management*, 27–32.

Nedeliaková, E. (2007). Customer orientation, basic goal of quality improving within logistics chains, LOGI 2007: Proceedings of 8th International Conference External Providing of Logistics Services. Lázně Bohdaneč, Czech Republic, paper 130–135.

Nedeliak, I. (2010). Methodics of quality level identification in the railway freight transport, Disertation thesis.

Nedeliaková, E. (2010). Approaches to assessment and evaluation of quality services in the railway transport, Habilitation thesis.

Nedeliaková, E., Dolinayová, A., & Nedeliak, I. (2012). *Management of railway transport 1.* Žilina, Slovak Republic.

Nedeliaková, E., Dolinayová, A., & Nedeliak, I. (2012). *Management of railway transport 2.* Žilina, Slovak Republic.

Palmer, V. S. (2001). Inventory Management Kaizen, Proceedings of 2nd International Workshop on Engineering Management for Applied Technology. Austin, USA, paper 55–56.

Terziovski, M. (2001). The Effect of Continuous Improvement and Innovation Management Practices on Small to Medium Performance, Proceedings of 5th International Conference on Quality and Innovation Management. Italy, Milan, paper 1–22.